

## CLAIMS

I claim:

1. A control system mode to periodically vary the speed of an electrically powered rotary artificial heart or heart assist device, having its inflow supplied from the left ventricle and its outflow connected to the aorta, comprising,
  - a. An electronic brushless DC motor speed control system adapted to set the timing of motor commutation power pulses based on a selectable input, so as to cause the motor to rotate at a speed (RPM) determined by said input,
  - b. An incrementally adjustable speed setting device which sets said selectable input,
  - c. A speed variation circuit adapted to generate a cyclical output which, when connected as the input of said DC motor speed control system, produces a varying motor speed, including a low speed portion of approximately 5 to 20 seconds duration, at least once every hour, during which the speed of the motor is run slow enough that the pump produces minimal or no net forward flow during diastole of the natural ventricle.
2. The control system of claim 1 including speed control circuitry having calibration devices and a switch to disable the speed variation circuit such that the pump runs at a constant speed according to the setting of the incrementally adjustable speed setting device, in which the calibration is adjusted so that the average flow produced by the blood pump at each incremental setting is approximately the

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same whether the pump is running at a constant speed or in a variable speed mode.

3. A control system mode to periodically vary the speed of an electrically powered rotary artificial heart or heart assist device comprising,

- a. An electronic brushless DC motor speed control system adapted to set the timing of motor commutation power pulses based on a selectable input, so as to cause the motor to rotate at a speed (RPM) determined by said input,
- b. A speed variation circuit adapted to generate a cyclical output which when connected as the input of said DC motor speed control system produces a varying motor speed,
- c. Said speed control controllable by the position of a speed control knob, which is adjustable in increments of approximately 5-25% of the maximum speed.

4. An artificial heart or heart assist device electronic control and battery system comprising:

- a. A control system module adapted to connect to an electrically powered blood pump by means of a cable and to simultaneously connect to and be disconnectable from either one or two battery modules without the need for cables,
- b. Said controller and battery modules having directly mounted thereupon, connector plugs and receptacles which when mated, may be rotated and maintain electrical contact of the plus and minus power contacts.

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5. The electronic control and battery system of claim 4 including a rotationally engaging locking mechanism which permits the male and female components of the connector to be mated by axially pushing them together, and locks the controller and battery together when they are rotated relative to one another.

6. The electronic control and battery system of claim 4 including a rotationally engaging locking mechanism which permits the male and female components of the connector to be mated by axially pushing them together, in which two coaxial electrical connector receptacles are mounted with plug receiving openings on a surface of the controller spaced closely enough that when a single battery is attached to the controller it may be rotated into a position which covers the opening to the second connector receptacle.